DETAILED ACTION

Status of the application

RCE filed on 07/29/2011

Rule 130,131 or 132 Affidavits filed 07/29/2011.

All the claims are as filed 12/23/2010.

Claims 1 to 23 are pending.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

1. **Claims 1 to 23** are rejected under 35 U.S.C. 103(a) as obvious over Zhang Weiji et al. (CN 1281906) in view of Schummer et al. (US4,605,449) and Nakasugi et al. (US4,138,278)

2. Regarding claims 1, 3-8. Weiji '906 discloses a low carbon steel sheet for the production of a high strength, high toughness, and corrosion resistant steel mooring chain. He does not specify low temperature. The composition of Weiji's steel is the same as applicant with Mos components have overlapping range, except Chromium 0.9- 1.4%. Schummer '449 also teaches a low carbon steel sheet for producing a rolled steel reinforced rod for concrete with high weld-ability, high yield strength with good notch impact toughness at very low temperature with C 0.08-20%. Nagasugi '278 teaches also a low carbon steel sheet with excellent toughness at low temperature with

Chromium content to be 0.6%.added mainly for the purpose of improving strength and toughness therefore the content can be raised. (Col8, line 4-10)

	Applicant	Wenji	Nakasugi	Schummer
C	0.16-0.25	0.25-0.33	0.01-0.13%	0.08-20%
Si	0.10-0.30	0.15-0.30	0.8-1.8%	0.20-0.40
Mn	0.80-1.60	1.45-1.75%	0.01-0.08%	1.60%
P	≤0.020%	≤0.020%	silent	silent
S	≤0.015%	≤0.015%	<0.015	silent
Cr	0.40 - 0.80%	**0.90-1.40%**	<0.6%	silent
Mo	0.30-0.50%	0.45-0.65%	<0.015	0-0.3%
Ni	0.70-1.20%	1.00-1.20%	0.2-0.4	below 9%
Al	0.020-0.06-%	0.020-0.05%	0.08-0.4	0.03-0.30%
N	0.007-0.018%	≤0.009%	0.001-0.009	silent
Nb	0.02-0.07%	0.02-0.06%	silent	0-0.3no%
The remainder being iron and impurities				

From the information given, it would have been obvious for one of ordinary skill in the art at the time of the invention to be motivated to improve the chain composition of Weinji by applying the teachings of Schummer and Nakasugi who teach low temperature steel , then modifying the amount of Carbon and Chromium as suggested. The carbon percent of lesser than 0.25-0.33% and the content of Cr of no more than 0.6% are derived from the teachings of prior arts and experimentation.(Col1, line 65-68).

An obviousness rejection predicated on selection of one or more components from numerous possible choices may be appropriate if the prior art provides direction as to which of many possible choices is likely to be successful .

Regarding claim 2. Weiji in view of Schummer and Nakasugi disclose the steel sheet of claim 1. Wenji teaches C content of 0.25-0.33, Schummer teaches C content of 0.08-0.20%, preferably 0.16 to 0.20%. It would have been obvious for one of ordinary skill in the art at the time of the invention to improve the steel sheet of Wenji, by lowering the carbon content to 0.23% as Schummer shows that at even lower carbon content, the steel still can have high notch impact toughness (especially for a chain) and with experimentation a range of 0.23% would be derived.

Regarding claim 9. Schummer teaches that " the steel sheet has a grain structure in the finished product which is extremely fine and extends throughout the cross section..." (Col3, line, 58-63). Both Schummer and Wenji do not specify the grain size is finer than ASTM 10. However as the steel sheet components have overlapped weight percents, the steel sheet of Weiji in view of Schummer would inherently have the same characteristics as the instant claim.

Regarding claim 10. Weiji in view of Schummer and Nakasugi disclose a steel composition according to claim 1 for the production of high-strength components by cold forming with subsequent temper-hardening. (SChummer, Col.3, ln 48,and col.4, line 69) And (Wenji on page 2 and on page 5)

Regarding claims 11,12,13,14,15. Weiji in view of Schummer and Nakasugi teach the use of these steel according as claim 10 wherein the components are means for the carrying, pulling, lifting, conveying or securing of loads, means for the connections of structural elements, chains which are round and welded.

Regarding claims 16,17,18. Weiji discloses the tensile strength of level four mooring chain of more than 860 MPa. As tensile strength of the chain is an optimized parameter, it would have been obvious for one of ordinary skill in the art at the time of the invention to experiment with component weight percent to claim a higher tensile strength such as 1,200 MPa, 1,550 MPa, 1,600 MPa. And tensile strength is an inherent characteristic of the steel sheet with component weight percents that Wenji in view of Schummer already disclose.

Regarding claim 19. Weiji in view of Schummer disclose a use according to claim 10. Weiji discloses a tensile strength of more than 860 MPa, and he is silent about the FATT of the component at -60C. Schummer on the other hand discloses the fracture appearance transition temperature FATT of the components is at least -60C (Schummer, col4, lin 42)

Regarding claim 20. Weiji in view of Schummer and Nakasugi disclose a use according to claim 10. Notch impact is the same as Charpy impact, and Schummer teaches a Charpy V value of 35 J. Wenji teaches a V value of 110-150J. As the steel sheet of Weiji is modified to have less Carbon content the notch impact value is now should be between 35 and 110. Notch impact working value is an inherent characteristic of the steel sheet, the steel sheet of Wenji in view of Schummer would have similar notch impact as claimed.

. Regarding claims 21 and 22, while Weiji and Schummer and Nkasugi do not disclose specific crack initiation toughness, as the composition of the steel taught by Weiji in view of Schummer, and the strength, notch impact, and elongation

characteristics are similar, it is expected that the crack initiation toughness would also be commensurate.

Regarding claim 23. Schummer discloses an elongation at break of more than 20. (Schummer, table 1,2, elongation 25-36%)

Response to Arguments

3. Applicant's arguments filed 07/29/2011 have been fully considered but they are not persuasive for the following reasons:

4. The instant claims pertain to a steel composition with excellent toughness, high strength at low temperature suitable for the manufacture of high-strength chains among other applications. The subject matter as a whole is unpatentable under US 35 USC103(a) as obvious by Wenji (CN1281906) who discloses a steel composition with high-strength, high toughness, corrosion-resistant with all the steel components similar as the instant claims with overlapping or butting weight range except Chromium with a 0.1% higher (0.9-1.4% vs 0.4-0.8%); Nakasugi (278) who discloses a low carbon steel composition with excellent toughness at low temperature, particularly the teaching of chromium impact on HAZ (Heat Affected Zone) wherein chromium is used for strength at 0.6% that can be increased as needed; Schummer (449) who also teaches a low carbon steel product having high weld-ability, high yield strength and good notch impact toughness at very low temperature wherein carbon content and niobium/vanadium/molybdenum relationship are discussed.

5. **0.40-0.80% Cr range**: Wenji application is a mooring chain used in sea water where corrosion from salt is a concern therefore the Chromium is at least 0.9% as a lower limit as it is known in the art, Chronium adding at high percentage is for corrosion resistance. Nakasugi (278) also teaches a steel composition with excellent toughness at low temperature with chromium at 6% that can be raised for strength. However, when present in an excessive amount, it increases the harden-ability of HAZ (Heat Affected Zone) and lowers the toughness and the resistance to the welding cracks (Col8, line 12-15). Therefore, it would have been obvious for anyone with ordinary skill in the art at the time of the invention with the desire to improve Wenji 's steel so it can be used at low temperature application, would incorporate the teaching of Nakasugi about the chromium percentage and with experimentation and optimization, one would be motivated to low the amount of Chromium of Wenji from 0.9% to 0.6 % of Nakasugi . Particularly in view of the fact that;

> "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages", In re Peterson 65 USPQ2d 1379 (CAFC 2003).

Also, In re Geisler 43 USPQ2d 1365 (Fed. Cir. 1997); In re Woodruff, 16 USPQ2d 1934 (CCPA 1976); In re Malagari, 182 USPQ 549, 553 (CCPA 1974).

An obviousness rejection predicated on selection of one or more components from numerous possible choices may be appropriate if the prior art provides direction as to which of many possible choices is likely to be successful.

Alloying of steel may not be predictable however, how each component should be added to achieve the characteristics of the final product is well known in the art with adjustments in the method of making such as quenching, rolling, etc....

As the difference here is only 0.1% wt for Cr, unless the applicant would show an unexpected result at 0.8% over Wenji, the claimed chromium range of 0.4- 0.8% is a mere optimization over Wenji in view of Nakasugi and Schummer.

0.16 to 0.25 % C. Wenji teaches C 0.25-0.33%, Nakasagi teaches 0.01-0.13% and Schummer teaches 0.08-20%, more specifically, at 0.18% (Col4, line 38). The claimed range of 0.16 to 0.25% which was amended from 0.8 to 0.25% to overcome the prior art and it is argued that as Weiji links the carbon content to the chromium content and provides a relationship through a carbon equivalent (Ce) with the equation, therefore any lowering of the Cr would result in raising the C . This argument is flaw as it ignores Molybdenum in the equation.

Tensile strength. Wenji discloses a that the level4 mooring chain requires to have a tensile strength to be greater than 860 MPa (page 1) with examples showing tensile strength of 1070 MPa, the claimed tensile strength of 1200, 1550 and 1600 MPa are obvious by the teachings of Wenji who teaches that the tensile strength is to be greater than 860 MPa. An obviousness rejection predicated on selection of one or more components from numerous possible choices may be appropriate if the prior art provides direction as to which of many possible choices is likely to be successful.

Furthermore, tensile strength is a characteristic to be expected of a steel composition disclosed by Wenji in view of Schummer and Nakasugi.

Conclusion

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to COLETTE NGUYEN whose telephone number is (571)270-5831. The examiner can normally be reached on Monday-Thursday, 10:00-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curt Mayes can be reached on (571)-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/COLETTE NGUYEN/
Examiner, Art Unit 1793

August 30, 2011

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1732